

### Remarks

Claims 1, 2, 5, and 6 are in the application, of which claim 1 is in independent form. Claims 3 and 4 are canceled by this amendment.

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) for obviousness over International Publication No. WO 98/52240 (“WO ‘240”) in view of Patent Abstracts of Japan Publication No. JP-02-155161 (“JP ‘161”). The Examiner states that WO ‘240 “teaches a battery separator comprising a polymer web comprising an ultrahigh molecular weight polyethylene . . . [having] sufficient molecular chain entanglement to impart high-strength mechanical properties to the polymer web” and that the web “further comprises a silica component and an antioxidant.” (Office action at 2.) The antioxidant described in WO ‘240 is “exactly the same antioxidant employed by Applicant,” and “the use of the antioxidant within the web indicates the presence of the antioxidant in the interior portion of the web.” (Office action at 2.) Conceding that WO ‘240 does not specifically disclose coating of the polymer web with the antioxidant material, the Examiner states that JP ‘161 teaches a polymer web coated with “paraffin oil containing an antioxidant material and phosphoric acid type peroxide decomposer to keep the battery separator from oxidizing deterioration at high temperature.” (Office action at 3.) Applicant responds as follows to this first obviousness rejection.

Applicant has amended independent claim 1 to recite a battery separator comprising a polymer web and a silica component, in which the polymer web includes fibrils of ultrahigh molecular weight polyolefin and the silica component imparts wettability properties to the separator. Claim 1 also recites a coating substance that includes an antioxidant material. The coating substance forms sheaths around the polyolefin fibrils throughout the web to suppress polyolefin degradation and leaves intact the wettability properties imparted by the silica component. Support for amended claim 1 can be found in paragraphs [0011], [0017], [0020], [0039], and [0041] – [0044].

Applicant contends that amended claim 1 would not have been obvious over the proposed combination of WO ‘240 and JP ‘161 because the latter describes a polymer web coated with a paraffin oil containing an antioxidant material. A skilled person would never have undertaken to make the proposed combination because it introduces a paraffin oil coating of the silica component particles that would diminish their wettability properties. Coating the silica particles with paraffin oil would restrict the ability of the battery separator pores to absorb electrolyte and thereby cause an undesirable increase in electrical resistance. The paraffin oil containing antioxidant material does not meet the

claimed coating substance, which leaves intact the wettability properties imparted by the silica component. Applicant requests, therefore, that this rejection be withdrawn.

Claims 1-5 stand rejected under 35 U.S.C. § 103(a) for obviousness over U.S. Patent No. 5,051,183 to Takita et al. ("Takita") in view of U.S. Patent No. 6,120,939 to Whear et al. ("Whear") and JP '161 as evidenced by International Publication No. WO 97/45365 to PPG Industries, Inc. ("WO '365"). The Examiner states that "Takita teaches a battery separator comprising a polymer web comprising an ultrahigh molecular weight polyethylene . . . [having] sufficient molecular chain entanglement to impart high-strength mechanical properties to the polymer web" and "further comprising (tetrakis[methylene(3,5-di-tert-butyl-4-hydroxyhydrocinnamate)] methane) as an antioxidant." (Office action at 3.) The Examiner contends that the use of antioxidant within the web indicates presence of the antioxidant in the interior portion of the web. The Examiner concedes that Takita does not specifically disclose coating of the polymer web with the antioxidant material but again relies on JP '161 for a teaching of immersing the polymer web to coat it with the antioxidant material. The Examiner concludes that it would have been obvious to skilled persons to form the coating material containing an antioxidant material as shown in JP '161. The Examiner also concedes that Takita does not specifically disclose the use of a silica within the polymer web but relies on Whear for a description of "a battery separator comprising a polymer web comprising silica particles . . . [to] lower electrical resistivities of the battery separator." (Office action at 4.) Relying on a motivational statement taken from WO '365, the Examiner concludes it would have been obvious to skilled persons to use silica particles in a polymer web lower electrical resistivities of a batter separator. Applicant responds as follows to this rejection.

In his argument in support of amended claim 1, applicant described in detail the problems associated with coating silica particles as described in JP '161. Applicant's arguments also apply to this obviousness rejection because it relies on the same descriptions set forth in JP '161. Applicant requests, therefore, that this second obviousness rejection be withdrawn as well.

Claim 6 stands rejected under 35 U.S.C. § 103(a) for obviousness over Takita et al. in view of Whear et al. and JP '161, as evidenced by WO '365, as applied to claim 1, and further in view of WO '240. Because the premise underlying this rejection is the same as that applied to claim 1, applicant submits that amended claim 1 is patentable for the reasons he gave in his arguments in support of amended claim 1. Applicant requests, therefore, that this third obviousness rejection be withdrawn.

Claims 1-5 stand provisionally rejected for obviousness-type double patenting over claims of copending U.S. Patent Application No. 10/154,937 in view of JP '161. Claim 6 stands provisionally rejected for obviousness-type double patenting over claims of copending U.S. Patent Application No. 10/154,937 in view of JP '161, as applied to claim 1, and further in view of WO '240. Applicant submits that his amendments to claim 1 renders these obviousness-type double patenting rejections moot because they are premised on original claim 1 and are supported by citation of JP '161, which applicant distinguished in his arguments in support of amended claim 1. Applicant requests, therefore, that these obviousness-type double patenting rejections be withdrawn.


Applicant has canceled dependent claims 3 and 4 because the amendments to claim 1 diminish the significance of the limitations these claims recite, and applicant has amended dependent claims 5 and 6 to recite terminology consistent with that of amended claim 1.

Applicant has amended the specification to correct minor grammar errors and a printing error.

Applicant believes his application is in condition for allowance and respectfully requests the same.

Respectfully submitted,

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